SCIENCE

FRIDAY, JULY 25, 1913

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THE MUTUAL RELATIONS OF MEDICAL PROGRESS AND THE PHYSICIAN[1]

SOME students of literature tell us that there are but seven different stories in the world. I should be inclined to add that there were but three different addresses for an occasion like the present.

Thus it is possible to select a chapter in medical history and revive the past; or discuss some striking achievement of the day and illuminate the present; or finally, to choose for consideration problems, the solutions for which are still in the making, and thus attempt to forecast and to mould the future.

It is from these problems that I have made a selection for this occasion and I purpose to speak on the mutual relations of medical progress and the physician—for you are physicians—in the nascent state, to be sure—but like the freshly liberated hydrogen to which the adjective is most often applied—capable of vigorous activity.

To say anything really new to you upon the topic here set down would be most difficult. We are all in the position of the old philologian who, when asked to explain why he gave no lectures, replied that he had not yet been able to get together a sufficient quantity of *new* facts to fill an hour. For the most part we who speak are obliged to overlook this unpleasant circumstance and endeavor to present familiar ideas in a new form—trusting by a happy presentation to drive them home.

To be sure, all of us are wonderfully pro-

[1] Address given at the eighty-fourth annual commencement of the St. Louis University School of Medicine, June 5, 1913.

tected against the infection of ideas—but it sometimes happens that our resistances are particularly low and if then the idea be "exhibited" in a peculiarly virulent form, it "takes" and the experiment is counted a success.

I turn now to the topic of the hour. The notion of progress which I wish to use neglects sheer turmoil and in a measure mere accumulative work—and puts the emphasis on our advance in leading ideas and guiding principles.

It is your relation then to such progressive changes in medicine, the effect which these changes have on your intellectual life and economic opportunities, and in return the influence which you, as physicians, can exercise on the advancement of your science, which I purpose to present.

My point of view is that of the laboratory man working in a field cognate to medicine, and my attitude is one of encouragement to yourselves and sympathy with the ills of the community that needs your aid.

By way of introduction let me call your attention to the fact that the idea of progress for humanity—so familiar to us now—is really rather new.

The most ancient view is well illustrated by an allegory taken from an Arabian manuscript of the thirteenth century. I use the translation given by Lyell in his "Principles of Geology."

It serves to show how, in the absence of sufficient records, changes may be easily forgotten, and it runs as follows:

> I passed one day by a very ancient and wonderfully populous city, and asked one of its inhabitants how long it had been founded. "It is indeed a mighty city," replied he; "we know not how long it has existed, and our ancestors were on this subject as ignorant as ourselves." Five centuries afterwards, as I passed by the same place, I could not perceive the slightest vestige of the city. I demanded of a peasant, who was gathering herbs upon its former site, how long it had been destroyed. "In sooth a strange question!" replied he. "The ground here has never been different from what you now behold it." "Was there not of old," said I, "a splendid city here?" "Never," answered he, "so far as we have seen, and never did our fathers speak to us of any such."
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> On my return there five hundred years afterwards, I found the sea in the same place, and on its shores were a party of fishermen, of whom I enquired how long the land had been covered by the waters. "Is this a question," said they, "for a man like you? This spot has always been what it is now." . . .
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> Lastly, on coming back again after an equal lapse of time, I found there a flourishing city, more populous and more rich in beautiful buildings than the city I had seen the first time, and when I would fain have informed myself concerning its origin, the inhabitants answered me: "Its rise is lost in remote antiquity: we are ignorant how long it has existed, and our fathers were on this subject as ignorant as ourselves."

To the people of this legend not only was the past unknown, but for them the future also must have shaped itself as an endless prolongation of the present. To talk to them about the scientific use of the imagination would have been a thankless task. They merely drifted on the stream of time.

When, however, the historical records were at hand and the great events were noted, attention turned to the possible changes in man himself.

During the twelve hundred years when western Europe was adjusting itself to the new order of things, men looked back to the great classic past as something beyond repetition or improvement, counting its leading men as of a vanished race of intellectual prodigies.

In his studies on "The Mediæval Mind," Taylor quotes a writer of the time as follows:

> Bernard of Chartres used to say that "we were like dwarfs seated on the shoulders of giants. If we see more and further than they, it is not due to our own clear eyes or tall bodies, but because

we are raised on high and upborne by their gigantic bigness.''

Here it is conceded that men changed, but the change was rather backward and for the worse.

In harmony with this idea we find three centuries later, when Vesalius was founding modern anatomy, that the discrepancies between his observations and those of Galen—whose teachings were then dominant—were explained by the fact, that since Galen wrote, the human body had deteriorated.

It is only since we began to command the forces of nature through the development of chemistry and the power of steam that the modern notion of progress has taken a firm root, because only since then have important discoveries followed one another with sufficient frequency to give the impression of a progressive series.

At present we somewhat readily concede to the past the greater men, but when asked to compare ourselves with our representatives of an earlier time there is a strong inclination to conclude that we ourselves are the better, for we can do so many things which they could not.

When one looks critically at the matter and endeavors to distinguish between material advances and biological improvement, this illusion disappears. It is evident that despite the external changes, the human being has remained almost unmodified. Although the *average* length of life has been increased by conditions which permit a greater number of people to approach old age, yet we see no evidence that for the individual the normal span of life has been extended. Although we are more guarded from pestilence, famine and war, and relieved from the distractions which they cause, yet equivalent emotional strains have replaced these distractions. Although for a number of people the economic situation makes the pursuit of food and shelter a less insistent occupation than before, yet into the vacancy so left there stream at once new obligations and unexpected interests, while at the same time there is no evidence that our minds have become either more acute or more vigorous. Nevertheless, as heretofore, each of us must live on twenty-four hours a day.

In brief, then, social development protects us and the preservation of past accomplishments leaves us free to attempt new ones, but within historic times, man—the dominant power on the earth—has changed but very little, if at all, while here and there the best achievements of his remoter ancestors still mark the high levels of human thought.

Nevertheless, in a sense, our opportunities are much increased. The world, at least the active part of it, has been more firmly knit together. We can get our bodies, our voices or our writing carried about the earth at marvelous speed and with wonderful safety.

A few uncommon languages still hinder intercourse between the nations, but in the main it is easy to learn precisely what is going on now and what has gone on for the last fifty or a hundred years. Ideas travel with the ease of Aladdin and his friends and everywhere men are testing, trying, proving and attaining new results.

This opportunity to try rapidly and on a large scale any new ideas that require to be tested yields in return a great mass of conclusions and judgments which must be considered both quickly and seriously—lest confusion follow in their train.

As a consequence of this condition one has at least the opportunity to think more often and more rapidly than a generation ago—not because the modern mind is normally more active, but because the food for thought is more abundant and more varied.

At worst, this brings distraction; while at best, it makes us frugal and foresighted in our mental life. At every turn, therefore, the study of efficiency is forced upon us—all the way from the correct position of our inkstand on the desk to the arrangement of our thoughts.

The interests which pass before us in a ceaseless train may prove almost embarrassing in their abundance, unless we are prepared for the experience.

Thus a man often finds himself in a position analogous to that of the courteous gentleman who felt that one should always hold open for an approaching lady any swinging door. Once at the main entrance of a large department store he began this practise early in the day. Closing time found him still at his post, for never through the long hours had the stream of passing ladies been sufficiently intermittent to allow him to move on without some damage to his self respect.

I say we find ourselves in quite an analogous position to this with regard to current ideas, and for this reason many of them must be resolutely disregarded. It is something of an art to use a protective inhospitality towards these many vital interests without creating by this act a feeling of dislike for those excluded, and thus weakening one's sympathy by the lack of use.

We may recall here as having particular fitness that view which regards life as a continuous adjustment between internal and external conditions.

As we grow older this continuous adjustment is made only with increasing difficulty. We become enmeshed in our special habits and loaded down with our private information—so that we do not move lightly or change with ease.

Perhaps one of the most striking results of the rapidity with which new problems and new ideals follow one another is the attitude of the active world towards the man of sixty, or shall I say, fifty.

Time was when the progress of ideas in a community moved at so moderate a pace that by gaining much experience in youth, a man in old age could have a store of facts as the basis of wise judgments.

To-day we have the startling situation that the matters on which sound judgment is demanded often belong to a group of events and happenings that have occurred since the man interrogated was in a position to get the needed experiences.

Such a one may be wise in the matters to which his own growing period relates—but unfitted to meet the questions of the moment which so often arise from situations developed since that period was closed. So it sometimes happens that a man advanced in life may belong not to his own generation, but to that which has preceded it—and there is a misfit.

Yet experience is ever and always the foundation of wisdom, and it follows that the period of acquisition must be prolonged. The existence of this situation is beyond dispute. Some method of adjustment to it must be found, and, if need be, we must revise our intellectual manners. Speaking broadly, we have perhaps been leading a somewhat thriftless mental life and needlessly curtailing the period of growth.

Suffice it to say that the demands on our attention, numerous as they are to-day, are bound to be more numerous a decade hence, and the first practical step is to employ a method of selection among the things to which one attends. We must imitate the miner. Gold is pretty widely distributed. There is said to be one grain in every ton of sea water. The city of Philadelphia stands on a brick clay deposit which contains enough of this precious metal to buy

a navy. But to recover this gold would cost many times its worth. One obtains gold, to be sure, by working in these places, but only at a great price. The distribution of knowledge is analogous and one must work or mine—to continue the simile—only where it really pays to work and leave the scattered dust of information to be dealt with by more effective methods.

There is one further aspect of the increase in knowledge and the rapid alteration in point of view that still needs a word. One may safely predict that what you have learned of method and right reasoning, such experience as you have gained in the art of observation and induction and the criticism of your own conclusions, will stay with you throughout life. So will many of the bits of knowledge which have stood the test of years and thus inevitably survived many an assault. These are the relatively stable things, and by virtue of that fact they can be expressed in a few words, without elaboration.

I desire to impress on you, however, that we must regard the knowledge of our time for the most part, not as final or ultimate in any rigid sense, but merely as the best available at the moment—certain to be improved with the advance of time, while, nevertheless, valuable and worth while in so far as it aids us to control natural phenomena, like disease.

In holding that in large measure our knowledge is open to change and to improvement, often of a fundamental character, we admit that in this respect our generation is only a repetition of those gone before, and this admission should make us very sympathetic with the past. No earlier age is to be discredited because of its tools. Primitive man with his stone axe or copper knife is to be rated by the use he made of his simple inventions. Thus in medicine your predecessors are to be esteemed for the intelligence with which they used their rough instruments and fragmentary information. Nothing is more certain than that the generations which follow us will also need to mingle mercy with their judgments.

Your knowledge then and the principles with which you work must be regarded in a twofold way: for each present moment, fixed; but for the future, transient.

When an experiment is in progress to test an hypothesis, the hypothesis for the time must be held as if rigidly true, for it is the hypothesis which is to be examined.

When, however, repeated tests fail to support it, then it may perhaps be put in a psychological museum, as a matter of historic interest or relegated to the scrap heap —a procedure usually to be preferred. The reason for putting emphasis on this point of view is found in the fact that it is quite contrary to one which, I regret to say, has often been tacitly encouraged, namely: that by learning rather dogmatically certain things through a small number of years, one was thereby fitted to care for the sick, and also thereby largely relieved from the need for further mental growth. Against such doctrine it is my desire to protest.

Nothing could be more unfortunate if medicine is to be regarded as a science and an art. As a matter of fact, the mental attitude evolved from the study of medicine depends but little on the precise subjects to which attention has been given. One may have studied more or less in many given directions—but if in his studies he has been occupied with subjects involving important and fundamental ideas, topics therefore suitable for training, if his instruction has been received from men who were not only informed on their subject, but contributing to its advance, he is well prepared for the problems of the physician.

In the older days, especially in western

Europe and her colonies, the apprentice system was in vogue in medicine. Theoretically there is no better. The apprentice learns from his master the history and principles of his science, receives correction and encouragement and watches at close range the master's methods and the exhibition of his skill, and has the opportunity to try everything himself. The system suffers mainly from the paucity of masters.

In passing I should like to recall your attention to the fact that exactly these advantages were those urged for the laboratory method of instruction when the personal contact of the teacher with a few chosen students were the features emphasized, and these relations still remain the ones for which we strive. Yet in the competition between the several methods of instruction during earlier centuries the didactic form prevailed—for reasons too obvious to need recounting here. From the first the weaknesses of the method were apparent, but teachers were in a measure misled by the persistent hope that through the spoken or the written word or through the picture of a thing or act they could effect in the nervous system of the student those changes which the independent act and thought by the individual himself alone can cause. We now know that if an animal be carried through a maze—even many times—it does not learn its way. It must go itself. The same is true for man.

So at the present day more training of the eye and hand and of the powers of observation and of inference are demanded. These pave the way for the many attainments which are to be exercised within the frame set by the philosophy, history and scope of your science. Through these attainments and within this frame you are to work in the light of the best knowledge to be had, realizing that among these conditions knowledge is the least stable and the most likely to take a turn for the better. Nevertheless, when one has reached the point of view that our knowledge is in a constant flux, there are some common difficulties which at once appear. Guided by the conviction that learning advances, we are sometimes in our enthusiasm misled by the notion that each new thing is probably an addition to the fund of truth.

But old men shake their heads. The life of a new discovery has been said to be for three years, and after it has survived for that time, it too often fades away.

I have a personal interest in this matter, for the laboratory is my habitat. It must be admitted that the atmosphere there is sometimes such as to force intellectual fruit unduly, and it may even be put upon the market while still quite green; but we grow wiser with experience, even in the laboratory, and the future I am sure will contain proportionately fewer premature revelations than the past. But leaving aside the group of false alarms and false hopes which have gone far to discredit the influence of the laboratories, there still remain the significant and well-grounded results which they have furnished. To these the practitioner must be alive and responsive in the same manner as he is alive to clinical advance, and not allow either prejudice or indolence to stand in the way of his utilization of these new facts for the benefit of those whom he is called to aid.

When the ideal relation is established, as it surely will be, between the physician and the well springs of new knowledge, not only will the practitioner find continuous aid and stimulus coming from the laboratory, but in return will use his best efforts for the extension and increase of the work which laboratories do; substituting enthusiasm and cooperation for the less helpful relations which sometimes appear.

It must be admitted frankly that in this

presentation the obligation seems to rest heavily on the physician, for he is urged to welcome and incite the activities of those who are bound as a result of these to ask him continually to replace older by newer knowledge. But it must be remembered that the interests of the community enter as a factor here, and since the community is better served by this, the equation is well balanced.

Sometimes it would appear that the thought of service had departed from its ancient place of honor—but in truth, it has merely changed the form of its expression. In the olden time the long cross country drives of the friendly doctor to a distant patient were justly presented to us as part of the hardships of a devoted life. Now the scene has shifted a bit, long journeys over the literature, some of it often rather rocky and uneven, or hours devoted to tests and exact determinations in his office laboratory, or even to experiments which hazard life, take the place of the earlier expressions of devotion and accomplish the same end—they make the doctor a better man.

Thus far it has been my purpose to indicate the relation of the progress of medicine, either by laboratory work in the strict sense, or through careful and systematic clinical studies, to your own mental attitude and growth.

This, however, is but the first part of the story; the second part deals with quite another matter. The laboratory has altered the practical and economic situation of the physician in the last few years to an unprecedented degree, and it is concerning this alteration that I wish to say a word.

To-day no physician would remove to the Canal Zone with the idea of making his main practise among those suffering from yellow fever; nor would he to-day expect as an army surgeon to have a great experience with typhoid. In both these instances steps have been taken which lead to the elimination of the diseases named—they simply are not there. I use these instances merely as an illustration of the fact that the health of the community has been protected and bettered in various ways. Thus we recognize that there are mechanical devices sometimes directed against the pathogenic organisms themselves or sometimes against their hosts. Pure milk and pure water mean fewer typhoid organisms—the draining of marshes, fewer places in which pestiferous mosquitoes can breed. The mechanical protection of screens and traps keeps from us disease-bearing flies, and shoes go a long way toward blocking the entrance of the hookworm.

Moreover you have vaccines for smallpox and for typhoid, to name but two, the effect of which is to render the body inhospitable to the organisms against which they are directed. Even when the disease-bearing organism has established itself, it is possible in some instances to kill it within the host, as in the case of the malaria organism and the *Spirocheta pallida*.

When this can not be done and the pathogenic organism is not only active but entrenched—there are antitoxins available, as in the case of diphtheria, by which the poisons that are doing damage can be neutralized, and finally protection of the body in the widest sense can be accomplished by general hygienic measures, so that the inroads of such persistent but unapproachable organisms as the tubercle bacillus may be blocked and prevented.

It is, however, not my object to give a discourse on preventive medicine or public hygiene, but merely to point out that a great deal has been accomplished in bringing under control a number of diseases which heretofore have been treated by the physician single-handed.

Thus one of the ideals of the profession —namely, the prevention of disease—has in recent years made advances toward realization beyond the dreams of the most sanguine a generation ago.

Medicine, like the law, is in a measure engaged in attempting to remove the reasons for its existence. As the feeling for justice and equity grows and the social conscience gains in strength, the law is freed to take up new and larger questions. So when we come to the province of medicine there opens before us a new order of things, arising from our progress in the control and elimination of disease.

The prevention of many important forms of disease has been carried far, but that is only the first step. This condition must be maintained. Here, as elsewhere, eternal vigilance applies. Moreover, new conquests in this field are yet to be made and much devoted labor and keen thinking are needed to that end. This brings the physician more and more into the service of the community at large.

It is in this connection, however, that we find a depressing maladjustment between the community and the physician. All will admit that he who does good to the many is certainly entitled to as definite reward as is the man who benefits a single person. Surely that proposition needs no arguments in its support. Nevertheless, to put the case quite mildly, as matters stand, the man dealing with the single patient is usually the more certain of his remuneration and the more directly recognized. Yet of the two his service is the less.

A fair adjustment of this defect in our social dealings has not yet been found—though certainly it will be. Despite this drawback, however, it can not fail to be a great encouragement for all of us to observe that those working for the public interest and the general good are many and industrious—too occupied with fruitful studies to make much talk about their own misfortunes.

You can not fail to have noted that the progress I have mentioned has been largely in connection with those forms of disease which are due to pathogenic organisms. With these we may contrast the great group in which increasing age and functional misuse and strain seem to be the more prominent factors.

Advances in this field might be noted too, but, passing over these, emphasis is to be laid on the fact that for the proper understanding and control of such diseases one is always seeking help from chemistry —organic, physiologic, biologic, as the case may be. To be sure, the use of chemical ideas by physicians is almost as old as medicine itself, yet the call for such ideas has never been so urgent as to-day, and this call taxes a portion of medical training which, in the past at least, was under-emphasized. It amounts almost to a sudden rearrangement of medical demands, for the commoner ailments, only slowly to be reduced by the gradual enlightenment of the laity, tend to become more and more those which must be met through the control of nutrition and other modifications of our daily life.

Of course when a period of rapid change like that at present in progress occurs in any profession or occupation, there is always created a really tragic situation by reason of the fact that some among the older men have not been taught and can not learn the newer ways, and thus inevitably suffer disadvantage. For them the new ways are bad—and for them the times are out of joint. Naturally the capacity to progress is a highly variable gift, but many instances go to show that it is often thought to be exhausted where there is still much remaining in reserve.

In his discussion of the energies of men, William James has pointed out some possibilities in this direction which both cheer and stimulate. To advance this way sometimes calls for the preliminary removal of worn-out mental furniture. Few of us have escaped some forms of undesirable instruction—we have been given details in place of principles, aid instead of exercise, views as substitutes for demonstrations—and thus in respect to some sorts of knowledge it is as important to know how to let it go as in other cases to know how to grasp the parts worth while. Thus the aim of the progressive man must be to see life steadily and see it whole—prepared to change when change is growth, unwitting of fatigue, and never a worshiper at the shrine of his own past efforts, no matter how strenuous these may have been. Much more might be said upon this topic of the new demands and the adjustment for which they call, but if enough has been given to make you see that a serious problem lies that way my purpose is accomplished.

The moment has now come, as it does to every speaker, to wonder whether success has followed his attempt to reveal what he had in mind. What I have wanted to show you was this: The attitude towards knowledge during our student days is almost necessarily such as to throw the idea of change into the background and unduly to emphasize the permanency of the things then taught. The facts are otherwise.

Change has always been—will always be—and in the near future progress will be more rapid even than to-day. It is to this main fact that I urge you to adjust, for which I encourage you to prepare. The progress with which you have to blend your lives comes from work at the bedside, in the hospitals and in the laboratories and is also a by-product from advances in fields often seemingly remote from medicine.

Moreover, social advances, the growth in the attitude of the community at large—which slowly alters like the form of a great cloud—presents an ever-changing background for the activities of the physician. Two important consequences of this touch you as medical men.

To succeed in truth, you must be prepared continually to replace old knowledge by new and to alter old economic methods and customs to meet the disappearance of some familiar forms of disease and their replacement in your life by newer medical problems and demands often of a general and a public nature.

To the generation of physicians to which you belong this task is allotted and it calls for the best you have to give. Surely the devotion to human welfare can not be less strong with you than with your noble predecessors and no hampering self-interest should be allowed to obscure from you the larger purposes of science and the sacred responsibilities of your profession.

Finally, it is through you that the layman learns of medical progress and its meaning, it is to you that he brings his questions and his doubts concerning methods of experiment and modes of inquiry needful for the advancement of your science, and both your appreciation and support of research in medicine are necessary to keep the public so informed that its representatives and lawgivers shall understand the purposes of this work and grant to it intelligent support.

HENRY H. DONALDSON

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
A NATIONAL UNIVERSITY BASED ON NATIONAL IDEALS[1]

BEFORE such a learned organization it is not necessary to dwell on the development of the modern university from its ancestral

[1] Address before the Section of Education at the Cleveland meeting of the American Association for the Advancement of Science.

prototype established by Abelard in Paris. By its very nature a university is the most conservative of organizations and its dominance over the thought of a people and all minor forms of education has been always acknowledged. The challenge to this right has always arisen outside its walls and influence, and such challenge has taken the form of many kinds of technical institutions to meet specific needs of the community forming their organization.

Neither is it necessary for me to point out to this audience how the idea of a specially favored educated class has always prevailed, and probably must always continue to a great extent. It was not, however, till our people grew up to independence on the basis that all men are created equal that the free public school became the corner-stone of our national life. Our material success as a nation is largely attributed to the splendid system of common schools and we congratulate ourselves that they are the best in the world. This national pride is flattered by the supposed acknowledgment of their superiority as evidenced by the visiting boards of inspection that come here occasionally from foreign countries. There seems, however, to be no fear that self-complacency will lull us into inaction, for we are a progressive people, and are well aware that institutions which are too tightly bound by fixed methods inevitably begin to die. Everywhere we are alive to our shortcomings, and great as our educational system is, nevertheless we are ever aware that somewhere, somehow, things are not altogether right.

It is safe to say that education is both an economic and a social question. Let us now consider them both. So long as the laws limit citizenship to those who have attained twenty-one years of age, is it wise economy to allow the youth of our land to leave school at the age of fourteen or fifteen? Physically, mentally, morally and spiritually they are only partly developed, and yet our boasted system of education loses its hold on 80 to 90 per cent. or from eight to ten millions of our youthful population. The recent exhibition in Washington of the International Congress of Hygiene and Demography showed one phase of the result of such neglect of our youth, and as we have printed a bulletin on its relations to the university, copies of which are here for distribution, I will not now dwell on these arguments, but simply state that the sum total of the scientific research into vital statistics goes to show that crime and disease and degeneration are increasing more rapidly than the increase of the population; that genetically we are not breeding most from the best types of humanity but from the weaker ones. I ventured to point out that, as the school system fails to hold the children between the ages of fourteen and twenty-one, we are losing the most potent years for the development of character; that the real salvation of man is through work, self-respecting, self-sustaining toil and the opportunity to obtain happiness through intellectual and spiritual growth. Now let us return to the thread of our argument.

Inasmuch as over 80 per cent. of the youth leave the halls of learning so young, the conclusion is inevitable that the reason is because the education furnished, after that age, is not sufficiently in accord with the needs of the people. Either there is lack of appreciation of the value of additional academic education or else the mere cost of maintaining the child is too much of a burden on the family purse. Since by far the larger majority of the children are forced by circumstance or voluntarily leave school to earn a living, is it not self-evident that 80 per cent. of all public funds ex-

pended for public education above the grammar grade should be for vocational education? Not only so, but that such further public education should be for workers and home makers in the productive industries.

If you turn to the experience of the world you will find that the age of budding manhood has always been the age of apprenticeship. How can such a system of apprenticeship be established except by a close contact with the simplest forms of industrial life, developing each vocation as a natural sequence from the simple and fundamental to the complex and abstruse? In order to be explicit suppose we define the vocations as of two classes, the minor arts of expression or those which pertain to the care, development and maintenance of the body, and then the major arts of expression or those which pertain to the care, maintenance and development of the mind and the spirit. These two kinds of expression are so interlaced and interdependent that they can not be separated, and since also we are providing a university for a selected part of the eighty-odd per cent. of the youth of the land who now have no means of attaining a full development of their native ability we must consider the two as virtually one problem.

The first duty of such an educational system is to make each student self-supporting as soon as may be through the minor arts of expression or the care and development of the body. This must necessarily begin with tilling the soil and following the industrial trades that contribute to husbandry, which, of course, includes almost everything. This implies that the university and its subsidiary branches must be in control of a large quantity of land on which to demonstrate the application of all the arts and sciences to daily life. Not on the commercial basis of making the student have the maximum of efficiency in the production of wealth for the sake of profit and gain alone, but also in all the major arts of expression which contribute to the intellectual and spiritual enjoyment of life—in plain words, to know how to live for the real things which make life worth while. To put it more bluntly, our present public school system will always fail of its final purpose unless it can develop the best there is in every one of our nation's children, and this can be done only by making it a possibility for any one, with the ability and the will, to make his own way through an industrial university established on the American ideal that every one should have a fair chance in the race of life—a chance to be self-supporting, self-reliant and have an all-round physical, moral, spiritual and industrial education up to the period of manhood, instead of being turned loose on the world while still children, as is now the custom.

Everything is ready for such a university. We have all the minor forms of the arts of expression already well established in state industrial schools, agricultural colleges and experiment stations. It is only necessary to establish at some central position, like the national capital, a great university with abundance of acreage to demonstrate the infinite possibilities of the minor arts and also the major arts of expression such as music, poetry, the drama, painting, sculpture and architecture, and devoted to the advancement of science. Our great new country with its marvelous natural, undeveloped resources has of course demanded the development of the people in the minor arts of expression first. After we have measured the greatness of a nation in its material resources and attainments, it remains to inquire what they have done in the realm of the major arts

of expression. It is only in the application and use of these major arts to the daily life of all the people that we can as a nation attain our inalienable rights to life, liberty and the pursuit of happiness—happiness that is spiritual and not merely physical. It is the lack of this intellectual and spiritual resource within ourselves that is the cause of so much discontent and misery among our people. Depriving the youth of the land of these higher things of life is robbing them of their birthright as citizens of this great republic. Therefore such a national university devoted to these higher aspirations of the soul is just as much a national need and a national duty as the primary school, and without which our educational pyramid has no apex.

Such a university in no way competes with or interferes with those state and denominational institutions which already exist, but by cooperating with them and supplementing the work they are doing it will bring all our educational forces into one harmonious whole and ever provide them leaders and teachers along new lines. By the establishment of local university centers wherever the present educational forces are inadequate for the needs of the people, it will be taking higher education to the people in a way that could never have been done before. We have at present an abundance of education for the rich and well-to-do; let us have in this new university an abundance of education for those who have to win their own way and are willing to give some share of their own services to the nation in part compensation for the advantages which the nation gives them through such an institution of learning. Let it be an institution where high pressure and haste are not the dominating influences, but one where thoroughness and devoted service may be an essential element. It is not necessary to force all wisdom through the human mind in a four years' course. Study and research should be the constant companion through life and a distinct gain will result in having one university wherein there is always contact with active production, and application of the arts and sciences to the life of the people. Another distinct gain will be in the holding in one institution the interlocking minor and major arts of expression just as they are in life, instead of having them separated as at present in various institutions. By this means we would teach that it is just as honorable to make a beautiful and useful basket or chair as to paint a picture or finance a railroad. The quality of excellence, honesty and utility applies to one as much as to another. We are not all qualified for the same work, and the influence of such a university would be to make it more easy for every one to find that occupation for which his natural gifts qualify him to attain success.

Our present scheme of education is to keep the student in an uncertain frame of mind as to his future work for as long a time as possible in the hope that the broad general education attained under such influence will enable him to choose a vocation more wisely. This may be true in a very, very, few instances but it usually has just the opposite effect of scattering the attention and inclinations while limiting at the same time the horizon line, on account of the very few professional courses provided. The policy of most universities seems to be to fence themselves in and make it ever more difficult for the student to enter on the plea that they are raising the standard of the scholarship. If a Phidias, a Raphael, a Mozart, a Galileo, a Shakespeare, a Tessler or a Hirschel, should ask admission to a modern university by reason of his ability, he would be examined in cube root, conic sections, ancient and modern history, and

required to analyze and parse Spencer's "Faerie Queene." The basis of examination is of analysis and criticism and not of construction and production. In all other things we are a practical people and our national university should broaden the lines of approach to higher education and make it possible to attain success in all the walks of life. Especially do we need an institution for constructive and vocational education in the major arts of expression. Only by a definite technical training in them from an early age, coupled with a broad general education, can we hope to attain great things in music, poetry, painting, sculpture and architecture.

The Department of Agriculture has had no great difficulty in building up a great system of scientific experiment and distribution of knowledge in everything which pertains to life on the farm, on the plea that all wealth comes from the soil, yet only one third of our population gain their living by tilling the soil. We ask of this new national university that it shall give an equal chance to the remaining two thirds of its citizens. We ask for the eighty-odd per cent. of our children the privilege of using the seven most important years of their childhood for their own development in an institution of learning where they may utilize their own earning capacities for their own growth.

This new university should recognize that every youth has the inalienable right to such instruction as will develop all the best there is in him, and this can be done best by making him self-supporting and self-reliant until he can take his place at maturity fully equipped for the battle of life. This is not to be attained by pampering and protection, but by tempered hardship and strenuous voluntary effort. Youth naturally seeks these environments and because our schools and colleges do not furnish them for those who need them most, such an institution is not only an economic necessity but a moral necessity—if we are to rise to our national ideal that all men are created free and equal. Free to make the most of life and equal in the opportunities for self-development.

The government, early in its life, established schools for the Army and Navy on the necessity of national defence. Any national university must obviously give place to training for the civil service and the consular and the diplomatic service. For these reasons, if no other, the university and its subsidiary branches should give degrees or diplomas that will answer for civil service examinations in the many grades of this occupation. This kind of training is so varied and frequently so technical that no existing institution could be expected to do it for the government.

Of course, the great central university devoted to the highest kind of research in science, arts and letters, should reserve to itself the higher degrees, and that the attainment of such high degrees should be of such a kind as to have national and international importance.

Every great movement for the salvation of man from the sloth of degeneration has taken the form of exalting the people's ideals into a religion. Under such influence the world has tried salvation by faith, salvation by creed, salvation by vicarious atonement, salvation by law. Each age has also built great temples to their ideals to give definite form and power to their aspirations. If we are true to our national ideals of liberty we will build a temple to liberty in every county and city ward, where we may enthrone science and art and liberty for the salvation of mankind. During the centuries past the world has bowed before the privileges gained by force of arms, privileges granted by royal favor,

privileges gained by wealth. It remains for the American people to establish, by means of their ideals and temples to Liberty, the nobility of character as expressed by service to the welfare of all, through the realization of the brotherhood of man.

"I ask not wealth, but power to take
And use the things I have aright,
Not years, but wisdom, that shall make
My life a profit and delight.

"I ask not that for me the plan
Of good and ill be set aside,
But that the common lot of man
Be nobly borne and glorified."

H. K. Bush-Brown

THE SCIENTIFIC STUDY OF THE COLLEGE STUDENT[1]

It is worthy of note that, while the critics of the college have been able to adduce facts as the basis of their unfriendly opinions, the colleges have, for the most part, been unable to point to any considerable collection of accurate data regarding their own present effectiveness. It is, of course, quite true that the deductions drawn from their facts by these unfavorable critics are oftentimes manifestly more imposing than the factual structure can properly stand. It is also true that along certain detached and scattering lines this college or that has been able to point with pride to a small amount of accurate material more or less scientifically collected. Speaking broadly, however, the statement first made is true. It is perhaps to be acknowledged that the introduction of the larger use of facts into the measurement and development of college values will make education somewhat less interesting, for it will reduce the range of philosophical discussion and the application of personal opinion. Still, if the signs of the times are at all to be believed, the day is fast approaching when the colleges and universities will be using facts and the scientific method as much in the direction of their educative processes, as a whole, as they already are using them in their laboratories and classrooms.

Secretary Furst, of the Carnegie Foundation, has said that there should be little talk of efficiency in college work until something has been done to make use of the enormous collection of data already possessed by the colleges of the country in the records of the hundreds of thousands of students who have passed through the four years of the campus and into the work of the world. Certainly there does exist a large body of facts worthy of study in connection with the administration of the present-day college. It seems to me rather doubtful, however, whether these facts are as likely to be given the attention they deserve as those collected according to some new method and with closer reference to the various problems to be solved in connection with the present and the future generations of students.

If this question is to be answered in the affirmative, it raises another. Shall the information for measuring the effectiveness of the college work with the present generation be attacked piece-meal—one problem one year, another the next, one phase in one college, another phase in another—or shall each college endeavor to conduct a study that shall be for it at once fundamental, broad, permanent and, in addition, as nearly scientific as the twentieth century permits?

A study possessing these dimensions has already been proposed by one of the greatest educators America has ever known. In 1899, President Harper, of Chicago University, recommended what he called the "scientific study of the student." Said that educational path-finder:

[1] Address before the Section of Education at the Cleveland meeting of the American Association for the Advancement of Science.

This study[2] will be made (1) with special reference to the student's character—to find out whether he is responsible, or careless, or shiftless, or perhaps vicious; (2) with special reference likewise to his intellectual capacity—to discover whether he is unusually able, or bright, or average, or slow, or dull; (3) with reference to his special intellectual characteristics—to learn whether he is independent and original, or one who works largely along routine lines; whether his logical sense is keen, or average, or dull; whether his ideas are flexible, or easily diverted, or rigid; whether he has control of his mind, or is given to mind-wandering, and to what extent he has power to overcome difficulties; (4) with reference to his special capacities and tastes—to determine whether these are evenly balanced, or whether there exists a marked preference for some special subject; whether he prefers those aspects of study which are of the book type, or those of a mechanical or constructive type, or those of a laboratory type; whether his special gift lies along lines of an esthetic character, or those of a literary or scientific or philosophical character; whether his special aptitude, supposing it to be in the literary field, lies in criticism, or interpretation, or creative work; whether his preference in scientific lines is for the observational or the experimental side of work, or for general principles; and, finally (5) with reference to the social side of his nature—to judge whether he is fond of companionship; whether he is a leader or a follower among his fellows; whether he is a man of affairs, or devotes himself exclusively to his studies; the character of his recreation; the way in which he spends his leisure hours; whether he is compelled to work for self-support, or for the support of others.

These details, among others, will be secured in various ways; in part from preparatory teachers, in part from parents, in part from the student himself, in part also from careful observation of his work in the first months of his college life. It will be no easy task; but the difficulties will not be greater than its importance.

Such a diagnosis would serve as the basis for the selection of studies; it will be of paramount value in determining the character of the instructor under whom he should study; it will also determine the character of all advice given the student and of any punishment administered; likewise, it will determine in large measure the career of the student—will help him to find himself and decide upon his life-work.

[2] "The Trend in Higher Education," pp. 321–325.

The object of this paper is to recommend in detail the plan thus proposed. It is urged not as possessing the virtue of a dynamic in itself, but simply as a testing of the personal dynamics of the college to effect the purposes for which it was established in the hope of making practicable a wiser direction of those personal dynamics.

First of all, the college will need, in order to determine its effectiveness, will it not? to discover the position of the student at the moment of the beginning of his course. In order to accomplish this, it will wish to send out to the student's teachers in the secondary schools a blank asking for much other informaton than that at present desired. This other information would cover, as far as found practicable, the mental, moral and temperamental characteristics of the student, though in a less detailed manner than that suggested in the blank to be exhibited. Inquiry could also wisely be made regarding the educational and moral advantages of the student's parents and family, as well as the family's social, and perhaps also its economic, status.

At the same time a blank of a more intimate sort could be submitted to the parents, and also, in the case of a small town, to the local minister or the librarian, asking information regarding the personal characteristics of the student in question—whether, for instance, he is ambitious, energetic, serious-minded, truthful, of a plodding or intuitive mind, possessing marked self-control, etc. In the cities the obtaining of such information might conceivably be difficult; in the small towns, however, there is a wealth of personal interest in the chosen few who go to college which will be happy to make itself useful the moment colleges become organized to take advantage of it.[3] The smaller towns and cities,

[3] At the University of California facts of the kind suggested are obtained in order to facilitate the assignment of the proper advisory officer.

also, will admit of study as to their educational and moral characteristics by the officers charged with the recruiting of students—a study which will be found of financial as well as educational value.

To a student's rating as thus obtained from his friends would be added that obtained from the student himself at the time of entrance regarding such matters as purpose in attending college and strongest influence thereto, aim in life, favorite books, chief historical admirations, etc., as well as by a series of tests. Doubtless some adaptation of the Binet and other tests such as those of Professor Thorndike could be arranged by the department of psychology which would give in more or less approximate form the student's mental status and characteristics. To this there could very wisely be added by the same department the testing of the student's range of information by means of Professor Whipple's list of key words. With very little modification and extension, also, the present physiological examination could be made to include certain simple tests for the time and form of reaction to tactile and other sensations and perceptions—*e. g.*, color, form, sound, etc.

These tests, when assembled, would serve as an indication of the starting point for the agencies of the higher educative processes. Reference to this starting place would at least make more definite and exact the controversy with the unfriendly critics of higher education who assert that nothing definite can be claimed by the college, simply for the reason that its human material is so selected that a large proportion of the effectiveness of its graduates is due to that selection rather than to its institutional efficiency.

With the starting point thus determined, the measurement of the effectiveness of the college's activities becomes more serious as well as more active. Toward this end, also, there can be used a body of persons whose judgment should be better trained for the work than those consulted in connection with the other preliminary measurements suggested. It can surely not be too much to ask that every teacher should be asked by the administration to fill in for each student a blank submitted to him in some such form as the accompanying card. I have had the courage to outline such a card simply for the reason that at this point the whole question of the feasibility of the proposed scientific study of the college seems to me to hinge less upon the matter of psychology than of mechanism. In the minds of many authorities who have been consulted, that is, the practicability of the plan depends not so much upon its worthiness as upon its ability to secure the cooperation of the teacher, in competition with the other interests seeking his attention. Perhaps this will be accomplished all the better, accordingly, if the description of the student as called for by the card is not made of such a nature as to appeal only to the psychologist. At any rate, the plan is, apparently, likely to prove of practical value in proportion as it avoids the necessity for extra mechanical work at the hands of the teacher, who is very properly expected to be more interested in other things than the writing of needless words upon a card. You will notice, therefore, that our proposed blank is supposed to go to the teacher with the student's name, classification and other details above the double line already written upon it before it leaves the administrative office.[4] You will notice, further, that the card submitted—as also the other questionnaires recommended—is supposed to be filled out almost entirely

[4] It should be true of every one of the blanks used that persons asked to fill them should not be required to write a single word which the administrative office is in a position to write itself.

by the use of checks (✓), these checks to be supplemented by one or two general phrases under the caption "Remarks." A very little study by the administrative officer will detect plenty of ways by which they can save for the teachers enough time to offset the demand made by these cards.

In order, at the same time, to facilitate its own operations, the administrative office will plan to prepare, at one writing, with the help of a manifolding machine, the blanks required by all the different teachers during one year for each student, inserting separately only the study-classification, *e. g.*, "Soc. 17." On receiving them back from the teachers they can be assembled in folders and their material collated upon sheets—prepared also at one writing—for the use of the departmental dean, the disciplinary dean and the other advisory officers. On this sheet there should also be room for indicating the reports of the various entrance tests, in addition to the grades reported by the registrar or the secretary, and in addition, further, to the student's record in various student activities as reported by the officer charged with that responsibility. Every dean and advisory officer of any kind would, accordingly, have in his possession a complete showing of the student's whole life in college as well as the rating of a more general sort given him by his secondary teacher and his home friends, together with the more scientific rating resulting from the test on entrance. As his course advanced, more and more of this material should be shown on the upper parts of the blanks submitted to the teacher.

The advice and the whole range of attention given the student, therefore, at any time would be based upon this survey of his whole personality. Undoubtedly the attention given him by the various advisory officers would be immensely more valuable than is conceivable under the recent and present method of parcelling out a limited number of students to a number of teachers in the vain hope that an occasional quarter-hour or half-hour of conversation will serve to put the teacher in the position of an expert for the direction of the student's present activities and future career.

Is it going too far to take seriously President Harper's belief that "such a diagnosis would serve as a basis for the selection of studies"? Is it not conceivable that, at least to some extent, in the recommendation of studies, the advisers could have in mind the correction of the defects shown on the collated report? If, for instance, all reports indicate that a certain student possesses an able mind but refuses to use it carefully, is what might be called a disorderly thinker simply from pure mental laziness, could the adviser not wisely emphasize the value of mathematics or certain other of the exact sciences? Similarly, for the student who is a plodder, taking each step conscientiously at a time, but lacking the imagination with which to take a half or a whole flight of mental stairs at a leap, could not a good teacher of history, economics or other study calling for broad grasp and ability to generalize be recommended very strongly, if not with compelling power?

In that event each teacher could legitimately be expected to have in mind these uses of his teaching of a subject in addition to its usual informational or disciplinary values. Or, if that seem unfeasible, the teacher might be asked to bear in mind in connection with each member of his classes the particular mental aspect shown by the cards received from the administration office to be of greatest interest or of greatest need on the part of that student.

Whether such a use in the selection of studies is possible or not, there can be no

doubt that the diagnosis would be found tremendously helpful—indeed absolutely necessary—to that newest officer in the college world—I mean the vocational adviser. If he is to make himself genuinely useful to the student he will find it essential to possess himself of many more facts than can be obtained in any number of conferences with the student. It will be noticed, I venture to prophesy, that the vocational adviser, within six months after his election, will raise a cry for facts that will not be stilled until every part of the whole educational system—including the secondary schools—is busy handing them in perhaps in much the way here proposed. It is, as a matter of fact, significant that one of the few institutions in the country that have already been using a system comparable to this, is a school where the claim of the vocation is strong, the Massachusetts Institute of Technology. There, in addition to the gathering of detailed facts regarding every student, at the hands of his instructors, a stenographer is present at every faculty meeting where names of students are mentioned to record any remark made about them. Everything ever said or written concerning a student is gathered together for the use of the officer in charge of the placing of graduates. As a result of this the dean of the institute has assured the writer that the officers have enjoyed a remarkable success in fitting their graduates into positions making unique requirements. Doubtless for the same reason an approximation of the same plan has recently been proposed for the adoption of the Springfield Y. M. C. A. Training School by the committee charged with the responsibility of testing and increasing the effectiveness of that institution.

Further there will be added to the facts already collected the showing of the intellectual and general status of the student at graduation. These tests can be chosen from, and related to, those made of the entering freshman in whatever proportion and extent seems desirable. Undoubtedly, the application of Professor Whipple's "information range finder" would be particularly significant. If the student shows a much greater familiarity with such terms as "southpaw" or "snapback" than with "cytology" or "Pythagoras," it may be held to indicate that the realm of athletics had been more suggestive than that of science or philosophy. In any event, the tests chosen should serve as an approximate measurement of the advance made in scholarship, mentality, character, temperament and social qualities within the four years of the college.

Only an approximation, of course. The real value of the years could only be shown after the secretary in charge of alumni relations had made it his business to secure in legitimate and effective ways some general measurement of the effectiveness of the former student as a person and a citizen. It is quite likely that the next college officer to follow the vocational adviser will be such a secretary for alumni relations, charged with the very serious and statesmanlike responsibility of making the college mean as much as possible to the graduate and the graduate to the college. Possibly the vocational adviser would himself be this officer, traveling part of the year in order to consult with commercial, professional and other leaders, with successful graduates and with unsuccessful ones—all for determining in what ways the college stands in need of improvement as a developer of abilities, interests and viewpoints required for the meeting of the needs of the world.

When the report of such an officer has been turned in and put alongside the material already mentioned, then the college

will have the right to feel that it is conducting a study sufficiently scientific, serious and fundamental to be worthy of the seriousness and importance of its educational responsibilities. Then and only then will it possess a body of facts from which it can gain genuine light with regard to such problems as the following:

I. The relation between (*a*) the college course and "success in life" (however defined), (*b*) between scholarship and success, (*c*) between particular fields of study and success, etc. II. The extent to which the college course modifies the student's (1) character, (2) intellectual capacities and characteristics, (3) social and (4) moral nature, (5) life plans; with (6) the general direction of such modifications. III. The extent to which (*a*) it extends the fields of interest and information brought to college, and (*b*) adds new fields. IV. The approximate comparative importance as factors in these modifications of (*a*) teachers, (*b*) subjects, (*c*) student activities, (*d*) companions, etc. V. In comparison with the college, the influence on scholarship in college and on success in life of such elements of the home and preparatory environment, as (*a*) social, economic and educational status of parents (including the size of the family), (*b*) the geographical location, size and chief characteristics of the home town or city—especially in its general educational and moral agencies, also (*c*) the educational standards and methods of the secondary school.

Only then will every month and every year and every person connected in any way with the educative processes be made to contribute its proper quota to the wisdom which the present should receive from the past and the future demands of the present, a quota of which our educational generation has been cheated by an unorganized and unscientific past.

Only then, also—and it is to be considered one of the most important products, if only a by-product of the whole plan—will there be an organized way for making evident the distinction between the college and the university teacher. For if the blanks coming from any one teacher are found invariably to indicate a complete lack of interest in, and just judgment of, the pupil, it will indicate that, so far as the college is concerned, that teacher has probably not sufficient human interest to be worthy of his collegiate responsibility, though he may be entirely worthy of the work of interpreting his field within the less broad and general channels of the university.[5]

Who will attempt to estimate the value of a five-year study along the line suggested as conducted by a number of institutions, to say nothing of its value if conducted simply by one institution? Since President Harper proposed the plan, the world has made an amazing advance in the adoption of the scientific method. After all, the scientific method is nothing more or less than the collecting of facts and their use in the accomplishment of desired ends. In this use the facts are proved as well as taken advantage of. The period in which we live, as the result of the spread of this scientific method, may well be called the "pragmatic period"—owing allegiance, that is, not so much to the reign of law as to the reign of results. No one believes that the college is going to be found permanently unable to adapt itself not only to life, but to development and growth in such a period. But this means that it is

[5] "The college is the place for the student to study himself—and for the instructor to study each student and to point out his weak and his strong points. . . . The university is for men who have come to know themselves . . . to study in the line of their chosen calling." President Harper, "Trend in Higher Education," p. 324.

only a question of time until the college discovers its delinquency in having failed to observe that, while it, more than almost any other institution known, is charged with the development of broad human values, it is doing less to study these values and the means of their development in a broad, yet scientific, manner than are many commercial institutions not supposed to be at all concerned with human factors.

Can we not here to-day among ourselves "highly resolve" that President Harper shall not have lived and shall not have spoken in vain when he said regarding the plan thus described to you, "This feature of twentieth-century college education will come to be regarded as of greatest importance, and fifty years hence"—shall we not make it fifteen?—"will prevail as widely as it is now lacking. It is the next step in the evolution of the principle of individualism, and its application will, in due time, introduce order and system into our educational work where now only chaos is to be found."

Charles Whiting Williams
Oberlin College

THE AMERICAN MINE SAFETY ASSOCIATION

The annual meeting of the American Mine Safety Association composed of leading coal and metal mine operators, mining engineers, mine-safety engineers, and mine surgeons will be held in Pittsburgh, Pa., September 22–24.

This association, which held its first meeting a year ago, has for its purpose a reduction of the number of accidents in the mines and quarries (3,602 in the year 1911) and the alleviation of the more than 60,000 men who are injured each year.

Following the recommendations of the Bureau of Mines in the last three or four years many mining companies have organized rescue corps and first-aid teams, and as a result a number of different methods of procedure following mine explosions and fires and in the caring for the injured have developed. The men who gathered a year ago to form this association felt there was great need for greater uniformity in the work of the rescue and first-aid crews and at that time some very important recommendations were made.

This second meeting, which has been called by Mr. H. M. Wilson, of the Bureau of Mines, chairman of the executive committee of the association, promises to take up and discuss a number of the problems that have arisen in both the rescue and first-aid work. The members of the association declare that greater progress can be made in saving life and in reducing the seriousness of injuries by the adoption of the proposed standard methods.

The program will include a mine-rescue and first-aid contest at Arsenal Park on September 22; in the evening a reception to the members and motion-picture lecture on the mining industry. On the second day the opening session of the association will be held in the morning and a report of the executive committee will be made on the proposed constitution of the society. In the afternoon there will be an explosion in the experimental mine of the Bureau of Mines at Bruceton, Pa., to which all the members will be invited to be present. On September 24, the third day, there will be a business session at the hotel and a selection of officers. In the afternoon members will visit the experiment station of the Bureau of Mines at 40th and Butler Sts., Pittsburgh, Pa.

THE CROCKER LAND EXPEDITION

The Crocker Land Expedition (George Borup Memorial) sailed from the Brooklyn Navy Yard, New York, in the Newfoundland steam sealer *Diana*, on July 2, with the major portion of its equipment aboard. The ship called at Boston for 13,000 pounds of pemmican and other stores and sailed for Sydney, N. S., on July 6. Sydney was reached in the morning of the 9th, and there 40,000 pounds of dog biscuit, 13,000 feet of lumber, 40 pairs of snow shoes and 335 tons of coal were taken aboard. The *Diana* left Sydney on the 13th loaded to the rails, but she had yet to call at Battle Harbor, Labrador, to take up the 30-foot power

boat *George Borup,* which has been in storage there all winter, and twenty Eskimo dogs and an interpreter. The party was to leave Battle Harbor on Thursday, July 17, headed for the west coast of Greenland. A stop may be made at Disco, West Greenland, for the purpose of setting observation stakes in the glacier there, but the first real objective point is Cape York, where the walrus and seal hunting will begin.

It is probable that much of the cargo will be landed at Payer Harbor, Pim Island, but the main headquarters of the expedition are to be established at Flagler Bay on the south side of Bache Peninsula.

The Crocker Land Expedition, which is sent out under the auspices of the American Museum of Natural History, the American Geographical Society and the University of Illinois, is probably the most thoroughly equipped scientific expedition which has been sent into the arctic regions from this country. Its scientific staff is as follows:

Donald B. MacMillan, A.B., A.M., F.R.G.S., leader and anthropologist;
W. Elmer Ekblaw, A.B., A.M., geologist and botanist;
Fitzhugh Green, U.S.N., engineer and physicist;
Maurice C. Tanquary, A.B., A.M., Ph.D., zoologist;
Harrison J. Hunt, A.B., M.D., surgeon and bacteriologist.

In addition to these there are: Jerome L. Allen, detailed by the United States Navy Department for service as wireless operator and electrician; Jonathan C. Small, mechanic and cook; while Edwin S. Brooke, Jr., is on the ship this summer as official photographer to the expedition.

It may be recalled that the objects of the Crocker Land Expedition are

1. To reach, map the coast line and explore Crocker Land, the mountainous tops of which were seen across the polar sea by Rear Admiral Peary in 1906.

2. To search for other lands in the unexplored region west and southwest of Axel Heiberg Land and north of the Parry Islands.

3. To penetrate into the interior of Greenland at its widest part, between the 77th and 78th parallels of north latitude, studying meteorological and glaciological conditions on the summit of the great ice cap.

4. To study the geology, geography, glaciology, meteorology, terrestrial magnetism, electrical phenomena, seismology, zoology (both vertebrate and invertebrate), botany, oceanography, ethnology and archeology throughout the extensive region which is to be traversed, all of it lying above the 77th parallel.

The installation of a powerful wireless telegraph station in connection with an arctic expedition is a new feature, by means of which, if all goes well, communication will be maintained with the party throughout their stay in the north. It is expected that daily weather reports will be sent from Flagler Bay to the Weather Bureau at Washington by way of government wireless stations in Canada which have been kindly placed by the Dominion authorities at the disposition of the expedition. News of important events in the history of the expedition and of important discoveries will likewise be sent promptly to the American Museum and the public at large.

The original program of work for the expedition contemplated two years or three summer seasons in the Arctic, but supplies have been taken north which will enable the party to remain three years or even longer if the results flowing from the work seem to justify the extension of time.

The mishap to the *Diana,* which went ashore at Barge Point, Labrador, since the above was written, may require the transfer of the equipment to another ship, but will not otherwise interfere with the expedition.

SCIENTIFIC NOTES AND NEWS

THE University of Edinburgh has conferred its doctorate of science on the Hon. James Wilson, lately U. S. Secretary of Agriculture.

AT Pekin University on June 16 the commencement address was given by Dr. Paul Monroe, professor of the history of education in Teachers College, Columbia University. Addresses were also made by Dr. W. A. P. Martin, vice-president of the board of managers, and the Hon. James Bryce. The degree of doctor of laws was conferred on Professor Monroe.

Dr. A. Penck, professor of geography at Berlin, has been elected a corresponding member of the Paris Academy of Sciences.

The Royal Society of Edinburgh has awarded the Gunning Victoria Jubilee Prize for the quadrennial period 1908–12 to Professor J. Norman Collie, F.R.S., for his contributions to chemistry, including his work on neon and other rare gases.

Dr. W. Killing has for the second time been awarded the Lobachevski prize of the Physico-mathematical Society of Kasan.

Sir Archibald Geikie has been elected a trustee of the British Museum in succession to the late Lord Avebury. He was already an ex-officio trustee, as president of the Royal Society, but is now elected as a trustee for life.

The senate of the University of London has conferred the title of emeritus professor of chemistry on Sir William Ramsay, who has occupied the chair of general and inorganic chemistry at University College since 1887.

On July 23 an expedition for the study of marine biology, under the auspices of the Carnegie Institution of Washington, set sail from San Francisco for Thursday Island, Torres Straits, Queensland, Australia. The party consists of Dr. Alfred G. Mayer, director, and Professor Hubert Lyman Clark, D. H. Tennent, E. Newton Harvey, Frank M. Potts, of Cambridge University, and Mr. John Mills, engineer.

A cablegram from Peru to the Harvard Medical School indicates that the special expedition led by Dr. Richard P. Strong has made an exceedingly important discovery in establishing the difference between oroya fever and verruca Peruviana, a common and serious infectious disease. The party will return to this country in the fall. Their researches, besides those in Peru, have included investigations of the medical conditions in Guayaquil and the pest-ridden republic of Ecuador. Before their return they will study also the diseases in the countries of Central America and the regions of the Gulf of Mexico. Dr. Strong sailed from New York on April 30. In his party are Dr. E. E. Tyzzer, of the Harvard Medical School, and C. T. Brues, of the Bussey Institute.

Dr. Mawson has been informed by a wireless telegram that Sir Robert Lucas-Tooth has given a donation of £1,000 to the fund that Captain J. K. Davis is raising for the Australasian Antarctic Expedition. Captain Davis leaves England on July 18 for Australia. On his arrival there the *Aurora* will be refitted and will proceed to Commonwealth Bay to bring back Dr. Mawson and his six companions at present in the Antarctic.

The National Geographic Society has made a grant to Professor Lawrence Martin to enable him to make detailed studies in September at Grand Pacific and Muir Glaciers. He will (*a*) measure the recession of several ice tongues in Glacier Bay, (*b*) look for advances of glaciers, (*c*) study the exhumed forests in relation to former glacial oscillations, and (*d*) make soundings in Canada's new harbor and other uncharted waters recently vacated by the glaciers, to see the effects of ice sculpture below sea-level.

Francis Church Lincoln, professor of mining engineering in the University of Illinois, has resigned to accept the position of resident engineer for the Bolivian Development Company, La Paz, Bolivia.

Dr. Francis Gotch, professor of physiology since 1895 at Oxford University, has died at the age of 60 years.

Dr. Eduard Pechuel-Loesehe, formerly professor in the University of Erlangen, known for his contributions to geography and for his explorations, has died at the age of seventy-two years.

Dr. Max Dittrich, associate professor of chemistry at Heidelberg, has died at the age of forty-eight years.

Dr. Max Kassowitz, professor of diseases of children in the University of Vienna, has died at the age of seventy-one years.

The U. S. Civil Service Commission announces an examination for editorial clerk, for men only, on August 6 and 7, 1913, to fill a vacancy in this position in the Geological

Survey, Washington, D. C., at a salary ranging from $1,500 to $1,800 a year. The appointee to this position should have such a knowledge of English, printing, and book-making, elementary geology, and geologic nomenclature as will fit him to criticize and correct, acceptably to their authors, the manuscripts of the survey's reports; to prepare them for printing; to carry along the work of proof-reading through all its stages, and to prepare satisfactory indexes to the reports.

THE Vienna Society for the Investigation and Prevention of Cancer has established a laboratory for experimental work on the subject, mainly in the domain of chemistry and chemical therapeutics. It is to be amalgamated with the Spiegler Institute, which has been in existence nine years. Professor S. Fraenkel has been appointed director.

DETAILS of the allocation by the Mansion House committee of the Scott Fund are given in *Nature*. The allocation falls under the three main headings of provision for the relatives of those lost (or, in one instance, incapacitated), for the publication of the scientific results and for memorials. The provision for the relatives includes £8,500 each for Lady Scott and Mrs. Wilson, £6,000 for Mrs. Scott and her daughters, £4,500 for Mrs. Bowers and her daughters and £3,500 in trust for the child Peter Scott, with smaller sums for Evans's family and to meet need in other two cases. One of the honorary secretaries of the Royal Geographical Society, Capt. H. G. Lyons, F.R.S., undertakes the editorship of the scientific results of the expedition, and representatives of that body and of the Royal Society, with Surgeon Atkinson, will control the work. A total sum of £17,500 provides, besides the cost of publication, for the services of three biologists, three geologists, two physicists, other specialists and a draughtsman, and the figure of £800 is earmarked for the production of charts and maps. For memorials, a tablet in St. Paul's Cathedral and a group of statuary in Hyde Park facing the Royal Geographical Society's house are proposed. A contribution to a memorial to Oates is being raised by his regiment as a special expression of regard for the memory of one whose relatives need no assistance from the fund. The published results of the expedition will not form its only scientific memorial; the establishment of a trust fund of some £10,000 for the endowment of future polar research will preserve the memory of the expedition, and would, in the belief of the committee, have commended itself greatly to its leader.

THE United States Bureau of Mines is about to investigate the conditions under which a miner works, believing that the unsanitary conditions which exist in some of the mines as well as in some of the mining towns are a factor in the death rate among the men. It is intimated that these conditions not only unnecessarily cause the death of miners through disease, but they are often responsible for accidents which might not have happened if the miners were in perfect health. The bureau has organized what is known as the Mine Sanitation Section, in charge of J. H. White, engineer. The bureau hopes to bring about progress by appealing to the miner, the manager and the owner, showing that all three can assist, and how all three can be benefited by good sanitary conditions. It will reach the miner by means of illustrated lectures, moving picture exhibits and pictorial circulars. These will show how sickness and suffering are spread by careless habits, and will drive home the importance of personal and household cleanliness. The bureau will assist the managers by pointing out glaring sanitary menaces, and showing methods and costs of abatement. It will describe in bulletins common unsanitary practises and show the evils which follow in their wake. It will submit sanitary rules and regulations and show the best methods for their enforcement.

AT the Minneapolis meeting of the American Medical Association the committee on awards, of which Professor W. T. Councilman

was chairman, made the following report, which was adopted:

In view of the general excellence of all the exhibits, your committee found great difficulty in deciding as to their relative merits. It wishes to recommend highly the exhibits as a whole and the very effective manner in which the demonstrations were made.

The committee has awarded the gold medal to Dr. C. C. Bass, of Tulane University, for the exhibit of the "Cultivation of Malarial Plasmodia in Vitro."

As exhibits to be distinguished by certificates of merit, the committee recommends the following:

"Cancer in Plants," Erwin F. Smith, United States Bureau of Plant Industry.

"Intestinal Parasitic Diseases," Lillian H. South, Kentucky State Board of Health.

"Histology of Goiter," L. B. Wilson, Mayo Clinic.

"Studies in the Physiology of Anesthesia," W. D. Gatch, Frank Mann and Dowell Gann, Indianapolis.

"Exhibit of Fetal Peritoneal Folds by Means of Specimen Photographs and Drawings," Joseph Rilus Eastman, Indiana University School of Medicine, Indianapolis.

"Blood-vessel Suturing and Transplantation of Blood-vessels and Intestines," J. S. Horsley, St. Elizabeth Hospital, Richmond, Va.

"Röntgen-ray Plates of Lesions of Various Internal Viscera," D. H. Carman, Mayo Clinic.

In the *Journal* of the American Medical Association there is some further information as to the International Medical Congress which will meet in London in August. In the section of the history of medicine a wide interpretation has been given to the subject. In some cases the papers will be more or less of an anthropologic nature. A paper on the history of the relations of medicine and vivisection is among these to be presented. That the artistic side of the subject will be well represented is shown by the following titles: "Relations between Art and the History of Medicine," Hollander; "Physiology of Vision and Impressionism in Art," Leonard Hill, and "Painting in Relation to the History of Medicine," Corsini. Sir Shirley Murphy has promised a paper on the origin and growth of public health legislation. Sir William Osler will give an illustrated lecture on the earliest printed medical books. Dr. Sambon will discuss the light thrown by the healing practises of animals and savage men on the study of primitive medicine. In the section of psychiatry, over which Sir James Crighton Browne will preside, Janet will discuss psychanalysis; Dr. Adolf Meyer will read a paper on the psychiatric clinic, its aims, educational and therapeutic, and the results obtained in the promotion of recovery. Dr. Morselli will discuss the psychology of crime. In the section of anatomy Dr. C. U. Ariens-Kapper, of Amsterdam, will read a paper on cerebral circulation and the precise function of the furrows of the brain. In the section of physiology there will be a debate on the correlation of the organs of internal secretions and their disturbances. In the section of pathology shock is one of the subjects to be discussed, and there is a special subsection devoted to chemical pathology. In the section of bacteriology and immunity, among the subjects to be discussed are theories of immunity and anaphylaxis, the nature of virulence, filter passers, leprosy and allied bacteria. In the section of therapeutics there are many novelties, such as nonbacterial toxins and antitoxins, the comparative value of heart remedies, and thermal treatment. In the section of surgery there will be a special subsection devoted to anesthesia, general and local, and recent methods, such as spinal analgesia, and there will be a discussion of recent special methods of general anesthesia. Professor Yandell Henderson, of New Haven, Conn., will contrast the immediate and after-effects of spinal and local analgesia with inhalation anesthesia, particularly with regard to shock. Postoperative shock will also come under review. In the section of ophthalmology Professor Carl von Hess, of Würzburg, will read a paper on "Affections of the Eye produced by Undue Exposure to Light." In the section of hygiene and preventive medicine, the following subjects will be discussed: the effect of dust in producing diseases of the lungs, infant mortality in the first weeks of life, the factors that determine the rise, spread

and severity of epidemic diseases, the supervision of the health of children between infancy and school age, and the causes, prevention and treatment of visual defects in school children. In the section of naval and military medicine, the subjects are: hospital ships and transport of wounded, transport of wounded in hill warfare, water-supplies in the field, antityphoid inoculation, sanitary organization in the tropics, caisson disease and the physiology of physical training and marching. In the section of tropical medicine and hygiene the subjects to be discussed are plague, beriberi, leishmaniasis and relapsing fevers.

UNIVERSITY AND EDUCATIONAL NEWS

WASHINGTON AND JEFFERSON COLLEGE has closed a successful campaign for increased endowment, having raised the amount necessary to secure $100,000 promised by the General Education Board on condition that $400,000 be raised by the college. On June 30, the time limit set by the General Education Board, after an active campaign begun on April 15, last, with the Hon. Ernest F. Acheson as general manager, over $440,000 was reported. The entire sum thus added to the resources of the college may go to the general endowment fund, except $51,090 which represents the cost of the physics building, a notice of which was published in SCIENCE, June 27, 1913.

THE registration of students for the summer quarter at the University of Chicago shows a satisfactory increase over that of the last summer quarter, when more than three thousand students were enrolled. As usual, there is a large representation from the southern states.

ALL records for attendance at the summer session of Columbia University have been broken this year, the total number of students being 4,550, an increase of nearly 1,000 over last year, when the registration was 3,602. This is the fourteenth year of the session, which began in 1900 with 417 students. Since then there has been a steady increase in numbers, except in 1907, 1910, and this year, when the increase was much greater than the average. One of the reasons for the great increase in attendance this year is believed to be the improvements in the curriculum, especially in the courses in English. The classes here have been so large that it has been necessary to divide and subdivide them. Evening classes, a new thing this year, have also added to the popularity of the session, as have also the business classes. Besides this the entertainments provided are more numerous and varied than in any previous year. The attendance is almost as large as at the regular sessions of the university and the dormitories are almost as well filled.

THE government of India has refused to sanction the appointment of three professors in Calcutta University on the ground of their political connections. The senate of the university has passed a resolution objecting to this action and public meetings of protest have been held.

DR. GEORGE E. FELLOWS, formerly president of the University of Maine, succeeds Dr. Albert R. Taylor as president of James Millikin University, Decatur, Illinois.

DR. J. FRANK CORBETT, for thirteen years state bacteriologist of Minnesota, has resigned to devote his entire time to his work in the department of experimental surgery in the University of Minnesota School of Medicine.

DR. FRANK D. KERN, after nearly ten years as assistant and associate in botany to the Indiana Agricultural Experiment Station and part time instructor in Purdue University, has resigned to become professor of botany and botanist to the experiment station in the Pennsylvania State College. Dr. Kern has been a co-worker with Dr. J. C. Arthur in the taxonomic, cultural and other investigations of the rusts, and assisted in the preparation of part of the manuscript for the Uredinales in the "North American Flora," especially contributing the portion pertaining to the genus *Gymnosporangium*.

THE following announcements and appointments have been made at the University of North Carolina: President F. P. Venable has

been granted a year's leave of absence for travel and study abroad, and Dean E. K. Graham has been appointed to act in his stead; Professor M. H. Stacy, of the department of civil engineering, will act as dean of the college of liberal arts in place of Professor Graham; Robert L. James, C.E. (Cornell), has been appointed assistant professor of drawing; Parker H. Daggett, S.B. (Harvard), has been promoted from associate professor of electrical engineering to full professor in charge of the department; James M. Bell, Ph.D. (Cornell), formerly associate professor of physical chemistry, becomes full professor; W. L. Jeffries, A.M. (University of North Carolina), has been appointed instructor in chemistry.

Dr. P. G. Stiles, assistant professor of physiology at Simmons College, has been elected instructor in physiology in Harvard University.

Dr. Karl von Auwers, professor of chemistry at Greifswald, has accepted a call to Marburg, as successor to Professor Th. Zincke.

DISCUSSION AND CORRESPONDENCE

COLOR CORRELATION IN GARDEN BEANS

The note by Professor Hedrick on page 917 about the correlation of the color of the inside of the calyx cup and flesh of the peach is interesting. A similar correlation in garden beans has recently been observed at this station.

The blossom colors of many varieties of beans have been described as either white, light pink or pink, and most of the common varieties can readily be referred to one of these classes, though some varieties of the several classes may differ slightly among themselves in the depth and distribution of color.

There seem to be definite and constant correlations between these blossom colors and the color of the seed coat. A white or eyed bean is always white flowered unless possibly when the eye is very large. A white-flowered variety may have mottled or self-colored beans, but a genuine black pigment, such as seen in the black wax varieties, never accompanies a white or light pink, but always a pink flower. I do not recall any exception to this last. The bean may be pure black or mottled, with black appearing in the mottling, but in either case the flower is a pretty constant shade of pink. Sometimes a light pink flower may be associated with very dark colored seeds, yet their color is distinct from the genuine black of the black wax beans.

In general light pink flowers are associated with mottled or self-colored seeds of various shades of yellow, red and brown, but, as indicated above, never with a genuine black pigment, nor with white or eyed beans unless possibly when the eye is very large. It is probably due to the various seed coat colors that the flowers classed as light pink vary as much as they do among themselves; they are not as uniform as those classed as pink.

Just where the connection is between the blossom and seed coat color is not obvious but it is certain that there is some connection. Not only are the times of manifestation of the colors far apart, but there is no obvious resemblance between the colors. Why should a black bean arise from a pink or more exactly a purplish pink flower? Yet there must be some connection, and it would seem reasonable to believe that they arise from a common cause: that the plant possesses some pigment-producing substance capable of producing one color in the flower and an apparently entirely different color in the seed coat.

J. K. Shaw

Massachusetts Experiment Station,
Amherst, Mass.

A NEW METHOD FOR LABELING MICROSCOPIC SLIDES

It is very desirable that permanent microscopic mounts have permanent labels. Ordinary labels, even if of the best manufacture, are unsatisfactory, because the adhesive property of the glue becomes impaired with age. The so-called "Diamond Ink" which may be easily applied to glass, produces an etched surface which may be written upon and a permanent label obtained. This ink, however, is only sold by certain firms and as a consequence is not easily obtained.

this laboratory successfully is merely printing or writing the necessary description upon the slide with India ink. "Higgin's Waterproof (Black) India Ink," such as is sold at all book and stationery stores, is the ink used; a crow-quill drawing pen completes the outfit. The only necessary precaution to take in its application is to have the writing surface free from oily matter. This is removed simply by breathing on the slide and wiping briskly with a dry cloth.

The label so made is permanent as far as ordinary treatment is concerned. Xylol may be used freely to dissolve any cedar oil or balsam on the mount, with no injury whatever to the label; only a prolonged soaking in water would impair its permanence and such an occurrence would only be accidental.

This form of label has the advantage over that of the etched surface in that it may be as easily removed as applied; the whole label or portions may be changed by removing the unnecessary word, letters or figures with a penknife when the ink is thoroughly dry, or the whole label may be removed by rubbing off with a damp cloth. The India ink label because of its nature is more easily read than any other form of label.

A trial of this method will convince any one of its practical value.

ZAE NORTHRUP
MICHIGAN AGRICULTURAL COLLEGE,
EAST LANSING

THE METRIC SYSTEM

TO THE EDITOR OF SCIENCE: The attention of the writer was attracted to an article in a recent number of SCIENCE by A. H. Patterson, of Chapel Hill, N. C., in which he refers to the "wickedly brain-destroying piece of bondage under which we suffer" on account of the system of weights and measures in common use among the American people.

The only thing that the present system has to commend it to general use, if it has any redeeming quality at all, is that it is easier to follow along a beaten path than to make a change for the better.

The metric system is a simple, sensible, scientific and easily operated system of units and the best system that has ever been devised. That the metric system is practicable has been effectively demonstrated, for it is the universal system of scientific laboratories and it is high time that a strong public sentiment be created in favor of its general adoption. No doubt "a great part of the under-weight and false-measure frauds are due to our confused system of units."

It seems that the chief arguments against the adoption of the metric system are: first, the expense to manufacturers and commercial houses in connection with making the change; and second, the difficulty that would be encountered in educating the employers up to a new system. In the opinion of the writer neither of these difficulties is as serious as some people would try to have us believe and it is chiefly "selfish interests which are blocking the way of reform."

The cooperation of all scientists, the various reform leagues, the government bureaus and as many others as possible should be enlisted for the passage of the bill in favor of the metric system at as early a date as possible.

A. F. GILMAN
RIPON COLLEGE

THE YELLOWSTONE PARK

TO THE EDITOR OF SCIENCE: I have tramped, with knapsack and sleeping bag, more than a thousand miles through the wildest and roughest parts of the Rocky Mountains, camping out in the cheapest and most primitive fashion; and every one will understand, I think, that it is not as a molly-coddle that I say, from my experience during the summer of 1911, that the bear in Yellowstone Park are an outrageous nuisance.

I know of no more flagrant example of detached, red-taped sophistry than this: "A few instances are on record where people have been attacked and injured by bears" but "in all cases where the facts were known the person injured was more or less to blame."[1] In

[1] See letter of Jesse L. Smith in SCIENCE of June 20.

speaking of this as detached I mean that it must have been written either with little knowledge or scant appreciation of the facts.

During the summer of 1911 I traveled with three boys about 300 miles through the country south and southeast of the Yellowstone Park, and one night a man who had been turned away from the Reclamation Camp at Jackson Lake was seen prowling around our wagon, which was at some distance from the tent where we were sleeping. A little biggity talk about guns and shooting was enough to scare the poor fellow away, but if he could not have been scared away he would certainly have gotten a dose of lead.

When we got into the Yellowstone Park we pitched our tent in a good place and proceeded to take in the wonderful sights; but we were warned by a soldier that we must stand guard over our camp after dusk or we would be cleaned out by marauding bear. How would you, curious reader, like to be tied down to guard duty over a side of bacon in Yellowstone Park? We went there for another purpose; but we remembered that we were a long way from a base of supplies!

Our first night in the park we slept with an axe under our pillow, thinking to drive Mr. Bear out of our pantry if he should come in the night; which is precisely the most foolish thing we could have done, Mr. Jesse L. Smith to the contrary notwithstanding. If Mr. Bear should happen to be Mrs. Bear with a cub it would be pretty dangerous business. One of the killings (man killings) we heard of during the summer of 1911 was a three-cornered affair or rather a three-in-a-row affair of this kind, and the man was unfortunately in the middle. Quoting from the park superintendent we would say that this man "was more or less to blame." At any rate we must admit that he was thinking too much of his stock of grub and of his remoteness from a base of supplies. But we would not have been blameworthy if we had shot the poor hobo from Jackson Lake. No, before God, we wouldn't.

Mr. Jesse L. Smith's reference to the frightening of bear with Roman candles reminds me of the crank who proposed to squirt olive oil and phosphorus over the Bastile to set it on fire at the beginning of the French Revolution. Phosphorus was only a chemical curiosity in those days, and probably all that had ever been made would have amounted to less than a pound, and it is extremely amusing to read Carlyle's exhortation to this visionary crank to bring forth his phosphorus and olive oil! The unfortunate but blameworthy man above referred to ought to have had sense enough to have used a Roman candle, or, better still, a hand grenade filled with liquid anhydrous ammonia! He showed his respect for law, however, in not using a bomb containing liquefied prussic acid; that would have killed the bear.

We lost all of our grub at the Canyon, and we ate at the hotels during the remainder of our trip; a very pleasant change after eight weeks of rough and tumble camping, but extravagantly expensive from a teacher's point of view. We knew directly of several small camps besides our own that were raided during our five or six days in the park. Greenhorns, Mr. Smith would say. Yes, they were greenhorns in the park under the fatherly care of the superintendent and his company of cavalry; but it would not have been healthy for man or beast to have gone very far on that assumption outside of the park.

We heard incessant talk about marauding bears; just as we hear incessant talk about the weather in Kansas, without fear, but with deep concern. And we heard circumstantial accounts of at least two campers who were seriously hurt in trying to save their grub. Their midnight sallies were not like "routing a neighbor's cow from a garden patch," to quote Mr. Smith.

The simple fact is that either ninety-five per cent. of the Yellowstone Park bears must be killed off or soldiers must be placed on all-night guard around the chief camping places in the park. Mr. Smith, and to some extent also the park superintendent, make themselves ridiculous in looking at this matter in the spirit of complacent statisticians unmindful

of the cold fact that the exceptional cases are absolutely not to be tolerated.

"I would not have a single person," says Mr. Smith, "miss the great fun and superior advantage of camping out during the tour of the park because of the fear of the bears." Mr. Smith is pedantic in his choice of words. It is purely a question of vermin. And Mr. Smith, who boldly routs marauding bear with Roman candles, perhaps, if properly armed, he would not be afraid even of a bed bug.

W. S. FRANKLIN

SCIENTIFIC BOOKS

An Illustrated Flora of the Northern United States, Canada and the British Possessions from Newfoundland to the parallel of the southern Boundary of Virginia, and from the Atlantic Ocean westward to the 102d Meridian. By NATHANIEL LORD BRITTON, Ph.D., Sc.D., LL.D., Director-in-Chief of the New York Botanical Garden, Professor in Columbia University, and HON. ADDISON BROWN, A.B., LL.D., President of the New York Botanical Garden. The descriptive text chiefly prepared by PROFESSOR BRITTON, with the assistance of specialists in several groups; the figures also drawn under his supervision. Second edition, revised and enlarged. In three volumes: Vol. I., *Ophioglossaceae* to *Polygonaceae,* Ferns to Buckwheat (pp. xxix + 680); Vol. II., *Amaranthaceae* to *Loganiaceae,* Amaranth to Polypremum (pp. iv + 735); Vol. III., *Gentianaceae* to *Compositae,* Gentian to Thistle (pp. iv + 637). Octavo. New York, Charles Scribner's Sons. 1913.

Nearly seventeen years ago the writer of this review had the pleasure of making a notice[1] of the first volume of "a new manual of systematic botany," the same being the first edition of the book now before us. Two sentences in that review may be reproduced here.

> It is in every way a new work—new in its plan, new in its descriptions, new in its illustrations. . . . It will give renewed life and vigor to systematic botany, and doubtless will be the means by which many a student will be led to the study of the more difficult families.

Less than two years later in a notice of the third volume[2] the writer commented upon the "Rochester nomenclature" of the work, and said:

> It is inevitable that one result of its publication ["Illustrated Flora"] will be that the number of those actively opposing these modern features will rapidly grow less. It will soon be much easier to follow the modern innovations along the plain highway here made than to continue in the less and less frequented paths of the conservatives.

These prophecies have long since come to pass, and their quotation now enables us to see how far we have traveled since they were written. When the original volumes were written they seemed very radical, and almost revolutionary, but now as one runs them over they have lost their radicalness, and do not appear at all revolutionary. In their latest version, in this second edition, even the conservative reader finds little that will shock him. In these years we have moved very far in our notions as to systematic botany, and the "Illustrated Flora" has been a potent force in bringing about this change. The authors are to be congratulated for the part they have played in this revolution in systematic botany.

Comparing the present edition with the first we find that the whole number of species has risen from 4,162 to 4,666, while the genera have increased from 1,103 to 1,229, and the families from 177 to 194. Of the grasses (*Gramineae*) the first edition contained 371 species, while in the second there are 466. So the species of *Carex* are increased from 205 to 242. The *Compositae,* in the wider sense (including also *Cichoriaceae* and *Ambrosiaceae*) are increased from 569 to 625.

The treatment of *Crataegus* in the two editions may well be contrasted. In the first edition 15 species are recognized as occurring within the range covered by the "Flora," and the remark is made that "four or five others

[1] *Am. Nat.,* October, 1896.

[2] SCIENCE, August 12, 1898.

occur in the southern and western parts of North America," and for the genus, as a whole, it is said that there are in the world "about 50 species, natives of the north temperate zone, Mexico and the Andes of New Granada." In the second edition 73 species are figured and described from the same range, while the following statement is made for the genus as a whole. "About 300 species, natives of the north temperate zone, the tablelands of Mexico and the Andes; the center of distribution is the eastern United States." The genus has been of great taxonomic interest for ten years, about 1,000 species having been described from the United States during that period. Data are fast accumulating tending to show that many of these newly described species are hybrids.

In the Introduction (pp. ix, x) one finds the following condensed version of the "American Code," which takes the place of the longer statement in the first edition:

1. The nomenclatorial type of a species or subspecies is the specimen to which the describer originally applied the name in publication.
   (*a*) When more than one specimen was originally cited, the type or group of specimens in which the type is included may be indicated by the derivation of the name from that of the collector, locality or host.
   (*b*) Among specimens equally eligible, the type is that first figured with the original description, or in default of a figure the first mentioned.
   (*c*) In default of an original specimen, that represented by the identifiable figure or (in default of a figure) description first cited or subsequently published, serves as the type.
2. The nomenclatorial type of a genus or subgenus is the species originally named or designated by the author of the same. If no species was designated, the type is the first binomial species in order eligible under the following provisions:
   (*a*) The type is to be selected from a subgenus, section or other list of species originally designated as typical. The publication of a new generic name as an avowed substitute for an earlier invalid one does not change the type of a genus.
   (*b*) A figured species is to be selected rather than an unfigured species in the same work. In the absence of a figure, preference is to be given to the first species accompanied by the citation of a specimen in a regularly published series of exsiccatae. In the case of genera adopted from prebinomial authors (with or without change of name), a species figured by the author from whom the genus is adopted should be selected.
   (*c*) The application to a genus of a former specific name of one of the included species, designates the type.
   (*d*) Where economic or indigenous species are included in the same genus with foreign species, the type is to be selected from (1) the economic species or (2) those indigenous from the standpoint of the original author of the genus.
   (*e*) The types of genera adopted through citations of nonbinomial literature (with or without change of name), are to be selected from those of the original species which receive names in the first binomial publication. The genera of Linnæus's "Species Plantarum" (1753) are to be typified through the citations given in his "Genera Plantarum" (1754).

Enough has been said to show that the new edition differs so much from the earlier one that it must find a place upon the shelves of every botanical library.

It only remains to be said that while the new edition was passing through the press Judge Brown closed his labors, but not before he had seen the pages of the new book. To the surviving author we must offer our congratulations upon the publication of the present edition.

Charles E. Bessey
The University of Nebraska

The Mathematical Theory of Heat Conduction. By L. R. Ingersoll and O. J. Zobel. Ginn & Co., Boston. 171 pages.

The accurate solution of problems in heat transmission has been neglected in the past by engineers. They have been content to arrive at approximate results by empirical methods or by guessing. With the increased use

of electricity for the generation of heat has come the need for greater accuracy in calculating the rate of heat flow through insulation, the temperature distribution in bodies after any time interval, etc. In 1811 Fourier developed the mathematical theory of the conduction of heat, but until lately the practical applications have been few. The "Mathematical Theory of Heat Conduction," by L. R. Ingersoll and O. J. Zobel, although primarily a text-book, is a step towards making Fourier's methods available to the engineer.

After a historical sketch in the first chapter, the authors derive the Fourier conduction equation from the fundamental laws of the flow of heat. This equation is solved first, for bodies in which the temperature distribution has become steady. These bodies are the thin plate, the long thin rod, the infinitely long thin rectangular plate, etc. The general cases in which the temperature is not steady are then attacked. Equations are developed, giving the temperature as a function of the variables time and distance, the temperature distribution at zero time being known. These general solutions require Fourier's series and integrals, which are developed, and extended to the limits $+\infty$ and $-\infty$. Solutions are given for such specific shapes as the infinite solid, the semi-infinite solid, the slab, the thin rod, the sphere, etc. Also solutions are given for the cases where there is either an instantaneous or a permanent source of heat in the interior of the body. No attempt is made to prove that any of the solutions are unique, as this rightfully belongs to larger treatises.

Throughout the work the authors give many numerical applications, such as calculating the flow of heat through furnace walls; the rate of cooling of a setting concrete wall in cold weather; the heating effect of thermit welding; the rate of cooling of steel in tempering; the rate of cooling of the earth, taking into account the effect of radioactivity; the rate at which heat penetrates a fire-proof wall, etc.

In deriving the fundamental equations the authors assume, in common with previous writers, that thermal resistivity does not vary with temperature. The error due to this assumption is usually unimportant for metals, but the so-called insulating materials often show large temperature coefficients. It is necessary to consider this in many cases if we are to secure accurate results. In dealing with problems involving heat losses from a surface exposed to the air, the authors follow the custom of assuming the rate of energy loss to be proportional to the temperature of the surface. It is well know that this is not true, and there is sufficient data available in the literature to allow a much closer approximation than can be secured with the above assumptions.

One of the most important applications of the theory of heat conduction is to problems in which there are permanent sources of heat, as in dealing with electric furnaces. The authors solve a few problems of this kind, but they do not give them nearly enough attention.

Considerably more values of thermal conductivity constants have been published than are given in the appendix. The statement that "in the constants for poorer conductors the disagreement between different observers is frequently 50 per cent. or more" is correct. But there need be no such disagreement if the conditions of the measurements are given.

The book is quite the most satisfactory yet published, as a text for the study of heat conduction, and it should be widely used in engineering schools. As a reference book for the practising engineer it leaves much to be desired, although the material included in it is made more easily available than heretofore. It is a long step towards the development of an engineering knowledge of the transmission of heat.

C. P. RANDOLPH

SPECIAL ARTICLES

THE NEGATIVE PHOTOTROPISM OF DIAPTOMUS THROUGH THE AGENCY OF CAFFEIN, STRYCHNIN AND ATROPIN

SINCE the discovery that fresh-water crustacea which are normally indifferent to light could be made positively phototropic by means

of acids, alcohols and esters,[1] there have been various attempts to bring about a negative reaction by chemical means. It is true that raising the temperature, or the addition of alkalis, tends to break up positive collections of these animals, but such treatment does not cause a negative gathering. Until recently ultra-violet light of wave-length shorter than 3,341 A. u. has been the only generally successful means of artificially causing a negative collection of fresh-water crustacea.[2] But it has lately been shown by Drzewina[3] that the larvæ of lobsters give such a negative response when treated with potassium cyanide.

In a former paper it was pointed out that the addition of strychnin to water containing *Daphnia* destroys the positively phototropic responses of these animals, and that such treatment when applied to *Diaptomus* causes them to form a strong negative collection. Atropin gives the same result, but to a less marked degree.[4]

In order still further to test the effect of alkaloids and other substances upon the light reactions of fresh-water crustacea, the following experiments were carried out at the New Monterey laboratory during December, 1912. The material used consisted of *Diaptomus bakeri*[5] taken from the Del Monte lake. The freshly collected animals were put into finger-bowls, each of which contained 25 c.c. of lake water. The preparations were then placed upon a table near the window, but never in direct sunlight. Normally, *Diaptomus* is indifferent to light, the individuals remaining pretty evenly distributed about the dish. But the addition of acids, alcohols or ether always causes the animals in the dish treated to form a dense collection on the window side. In order to insure equal concentration of a given substance throughout the preparation, the latter was always thoroughly stirred after the addition of the reagent.

If, now, to a normal preparation there be added 0.6 c.c. of a 1 per cent. solution of caffein, in two minutes the animals all collect in a dense cluster on the side of the dish away from the light, *i. e.*, they become negatively phototropic. This collection remains thirty to thirty-five minutes. It was thus possible to observe opposite effects in two dishes of the same material placed side by side, the one with all of the animals forming a dense cluster nearest the window (caused by adding the acid), the other with all the animals collected on the side of the dish farthest from the window (caused by adding the caffein). In either case after the characteristic gathering, if the dish be turned through an angle of 180° the crustacea in it swim back across the dish and re-form, the collection having the former position with reference to the light. The addition of 0.05 c.c. of a ½ per cent. solution of strychnin nitrate to a normal preparation causes all of the animals to become negatively phototropic, but does not result in their forming a dense collection as in the case of caffein. Strychnin, because of its toxicity, causes the *Diaptomus* treated with it to die within five minutes. It was also found that if 0.5 c.c. of a ¼ per cent. solution of atropin (alkaloidal) be added to a normal preparation of *Diaptomus*, we obtain much the same result as with strychnin, *i. e.*, a weak negative collection. Other alkaloids such as digitalin, pilocarpin, physostigmin, ricin and cocain, gave no significant results with this form.

If the *Diaptomus* were first made positively phototropic by the addition of alcohol or acids, it was found impossible to alter their response by the action of caffein, strychnin or atropin. On the other hand, animals which had formed a negative collection under the influence of caffein, if treated with carbonated water, at once changed their response and, swimming to the light side of the dish, formed a positive gathering. This confirms my former statement:

[1] Loeb, J., "Dynamics of Living Matter," p. 131.

[2] Loeb, G., *Pflüger's Archiv*, Bd. 115 s.; Moore, A. R., *Journ. Exp. Zool.*, Vol. 13, p. 573.

[3] Drzewina, Anna, *C. R. Soc. Biol.*, Vol. 71, p. 555.

[4] Moore, A. R., Univ. Calif. Publ. Physiology, Vol. 4, p. 185.

[5] I am indebted to Professor Kofoid for the identification of this form.

While negative phototropism in *Diaptomus* can be reversed by acids, positive phototropism brought about by chemical means can not be reversed by strychnin (atropin or caffein).[4]

A. R. MOORE

THE UNIVERSITY OF CALIFORNIA,
July 8, 1913

THE POWDERY SCAB OF POTATO (SPONGOSPORA SOLANI) IN MAINE

THE potato tuber scab caused by *Spongospora Solani* (Brunch) has been known in Europe since 1842. It was recently reported from Canada by Güssow,[1] but has hitherto not been found in the United States. That it would become established here has been feared by those acquainted with the serious injuries it causes in Great Britain, whence heavy importations of potatoes were made in 1911 and previous years, to supply American markets.

The writer discovered this disease on June 23 in potatoes just brought to Houlton from Presque Isle, Aroostook County, Maine. There is no probability as yet that a large amount of *Spongospora* exists there, but 84 diseased tubers were sorted out of four barrels, which represented a lot of 500 barrels.

The milder forms of powdery scab resemble the common Oospora scab. The pustules are at first closed, but later break out into large open sori. Twenty-six of the tubers collected showed this form.

The source of the disease is not known. The original infection may have been brought from Europe before the Plant Quarantine Act went into effect or seed potatoes bearing the disease may have come from the adjacent province of New Brunswick, in Canada, where powdery scab already occurs.

It is hoped that pathologists all over the country will now watch for this disease and that every effort be made to stamp it out.

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[4] Moore, A. R., loc. cit.

[1] *Phytopathology*, February, 1913, p. 18.

A NEW SECTION SOUTH FROM DES MOINES, IOWA

THE grading of a new railroad line from Des Moines to Allerton, passing from Polk County through Warren, Marion and Lucas into Wayne County, affords an excellent series of exposures such as have never before been available in this region. The relation which this series makes evident assists in the interpretation of observations already recorded, and the section itself serves as a standard with which to compare work yet to be accomplished in south central Iowa and adjacent Missouri. The general relation will be of interest to all who keep informed on the Pleistocene work of the country.

The Loess

The best exposure of loess that the writer has seen in this portion of the state is south of Des Moines, half a mile north of Coon Valley. Here twelve to fifteen feet of grayish yellow porous loess with faint horizontal lamination may be seen capping the bluff for a quarter of a mile. At the two ends of the cut the loess is exceedingly fossiliferous, and charged with concretions. In the hills east of Carlisle, even as far as Hartford, a distinct fossiliferous loess may be seen; but further south it does not form a conspicuous deposit. On the brow of hills away from the highest portion of the upland it is not present at all.

The "Gumbo"—The Loveland

Along the sides of all cuts through the upland may be seen a clay yellowish above, bluish below, of a thickness varying from a few feet up to perhaps twenty feet. It is nearly free from pebbles, but here and there a few scattered ones may be found that are half an inch in diameter, and very rarely one as large as an inch. Two were recently found as large as two inches in diameter. There are found scattered through the clay grains chiefly of granite about an eighth of an inch in diameter. The clay is generally free from distinct stratification, often silty in appearance, and slumps badly throughout the entire length of the railroad. In the upland where thickest it is found on the bowlder and pebble-bearing portion of the Kansan drift with no

intervening plane of oxidation; but in places, and apparently at lower levels, a line of scattered pebbles is sometimes evident. In other places at still lower levels the plane of separation is marked by bowlders and a yellowish oxidized surface of the bowlder-bearing portion of the Kansan, the horizon that is so commonly seen in Warren, Madison and Lucas counties, which appearance led Bain to coin the term "ferretto." Here and there the deposit is replaced by beds of stratified sand revealing places of current action.

This is the deposit which McGee called the "gumbo" of southern Iowa. Perhaps there is no more important relation brought to light in the entire series of exposures than the relation of this common deposit for this part of the state. It is so free from pebbles, weathers so quickly, and forms a soil so like that formed from loess that it has by some (including myself) been judged to be a modified loess; but these excellent extensive exposures of the deposit in many variations leave no chance to doubt the conclusion that this "gumbo" is not a loess, but is related to the Kansan drift and deposited in the closing stages of the Kansan invasion.

The writer has thus far looked in vain for evidences of kames and drumlins. He has also in previous years endeavored to trace the boundaries of this same "gumbo" to ascertain whether it thinned out as if in basins, but found it through the upland and dissected by ravines. A main difficulty has been to distinguish between a low-ground gumbo and an upland gumbo, which were apparently connected along the sides of the large ravines. The sides of these new railroad cuts and the various excavations in low ground reveal such mixture and gradation due to wash and creep, in which stratification due to wash has not persisted, that it now seems necessary to recognize this form of low-ground gumbo as not contemporaneous with the upland gumbo, but largely derived from it. However, gumbo ten to twenty feet above the surface of the river valleys is found banked in against and on the Kansan drift, and apparently identical with the upland gumbo. (Such is the deposit at the Siegel Brick and Tile Works at Osceola.)

In the deep cut east of Sandyville the deposits above the bowlder-bearing portion of the Kansan drift are in two portions: a lower portion six feet thick and an upper portion one to two feet thick. The surface of this lower portion contains hemispherical depressions three to five feet in diameter filled with clay of the upper portion. It is probable that this irregular surface was due to a slight final movement of the ice before the last of the Kansan ice disappeared. No pebbles are found in the depressions, as might be expected if the depressions were potholes, and the cross sections are too rounded to appear due to stream erosion. The whole appearance suggests moulding by overriding ice.

Hitherto the oxidized portion of the Kansan drift found at a depth of thirty feet from the surface in wells of the upland, seen as the upper level of the "ferretto" at the same distance below the upland on so many hillsides, and marked on others as close to the bottom of the upland gumbo, was judged to be the oxidized surface of the Kansan plain, so conspicuous throughout south central Iowa, the gumbo itself being then considered a later deposit on this plain. Classing this gumbo as related to the Kansan drift rather than to the post-Kansan deposits raises the supposed level of this Kansan ground moraine by an amount equal to the thickness of the "gumbo," twenty to thirty feet, and supplies that much of uneroded material that in places could well have been surface settlings on the upland of the extensive Kansan plain as the Kansan ice gradually disappeared; in other places a deposit in hollows on the surface; in other places not deposited at all, or eroded since deposition.

On comparing the evidence revealed in this series of railroad cuts with the description which Professor B. Shimek gives of the "Loveland" found along the Missouri River in the western part of the state, announced in the *Bulletin of the Geological Society of America*, 1910, in Science, 1910, and very fully described in his "Geology of Harrison and Monona Counties," volume 20, Iowa Geo-

logical Survey, it is evident that this "gumbo" corresponds to his "Loveland," which he has found there well exposed and widely distributed, and has been the first to recognize.

The Bowlder-bearing Portion of the Kansan

At the fine exposure at Coon Valley only a trace of Kansan bowlder-bearing clay is left; but it appears in all the deep cuts to the south. The characteristics of this portion of the drift have been so frequently stated that a description is here omitted. South of Whitebreast Creek and across Lucas County numerous sand bowlders form a conspicuous feature of the Kansan bowlder clay. In places, where "gumbo" is not present, there is evidence of post-Kansan wash.

No Aftonian nor Nebraskan Exposed

The study of the section was undertaken with the expectation that numerous exposures of Aftonian interglacial deposits and of Nebraskan drift (sub-Aftonian) would be found; but the cuts are through the hills, and fills extend across the valleys. At the Avon gravel pit in the southern part of Polk County a steam shovel is now removing a coarse sand close to a level at which near by mastodon or elephant remains are said to have been found a number of years ago. These deposits are thought to be of Aftonian age. In a cut in Marion County the bottom of the Kansan drift there exposed contained a bowlder of blue clay apparently Nebraskan. With the exception of these two places all evidence of distinct Aftonian and of distinct Nebraskan is wanting. (The work of excavation is not fully completed near the southern part of Marion County.)

The Des Moines Formation

The Des Moines shales are frequently found above the level of the track bed from the outcrop near Coon Valley to the northern boundary of Lucas County, south of which place they appear but once. These exposures afford excellent opportunity to study variations in a preglacial surface.

The exposures in their present perfection will not last long, but at present they will well repay a day's tramp south from Des Moines, or, at Chariton, north from Chariton River.

Acknowledgments

During the summer several of the most important exposures were visited by Professors George F. Kay, B. Shimek and James H. Lees together with the writer, and the conditions found discussed in the field; but the parties named are not responsible in any way for the above presentation.

JOHN L. TILTON

THE AMERICAN ASSOCIATION OF MUSEUMS

THE eighth annual meeting of the American Association of Museums was held in Philadelphia, June 3–5. The most prominent feature of the convention was the discussion of general questions of policy in relation to future work.

The representation of museums of science in the membership has always largely exceeded that of museums of art, although the essential idea in the organization of the association was to afford a common meeting ground for the discussion of the "principles of organization and administration of museums, and their problems of technique, rather than matters of art, history or science as such." There is a strong sentiment among both science and art members that, since all museums exist for the purpose of giving visual expression to ideas, the methods of accomplishing this purpose must be fundamentally similar and vary only in application according to the nature of the material and of the ideas to be expressed. The field of the association, therefore, in no way conflicts with any of the many scientific, artistic or historical societies. For the purpose of promoting a more general appreciation of these facts, and to endeavor to secure greater equality of representation of the various classes of museums in the membership and in the programs of the meetings, a special committee was appointed. With an art man as president for the ensuing year, the time seems particularly opportune for this movement which is so essential to the full function of the association.

A committee was also appointed to consider what methods the association may adopt to promote the increase and successful development of

museums. It is generally recognized that the field for special museums in our large cities is extending rapidly, not only in the more familiar forms of museums of art, history and science, but in the newer form of industrial, commercial, technological and social museums. It is also recognized that the field of the general museum as a center, not only of education, but of civic and social movements in smaller communities is only beginning to be appreciated. These smaller institutions differ in many ways from those of the larger museums of more limited scope, and they feel the need of organized assistance from the association.

Taken as a whole, the papers and discussion at recent meetings indicate a desire that the association shall formulate a digest or compendium of museum practise which may be used as a guide by the smaller museums. The Directory of Museums, published for the association in 1910, was designed to afford a part of the data for such studies, and more recent statistics on some of the points covered by that work will be available in the forthcoming report of the United States Commissioner of Education, which will include, for the first time, a section on museums.

The following papers were read at the meeting and will be published in full in the *Proceedings:*

"Industrial Museums for American Cities," Franklin W. Hooper, The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y.

"A Group Showing Animals of the Wharf Piles," Roy W. Miner, The American Museum of Natural History, New York.

"Meteorite Collecting and Collections," Oliver C. Farrington, Field Museum of Natural History, Chicago.

"A Method of Mounting Wet Specimens Showing their Natural Environment," Charles F. Silvester, Museum of Princeton University, Princeton, N. J.

"Use of Museum Resources in Public Instruction," Witmer Stone and Stewardson Brown, Academy of Natural Sciences, Philadelphia.

"Observations in European Museums of Art," Benjamin Ives Gilman, Museum of Fine Arts, Boston.

"Museum Work at the Capital of Canada," Harlan I. Smith, Victoria Memorial Museum, Ottawa, Canada.

"Museum of the Ohio State Archeological and Historical Society," William C. Mills, Ohio State Archeological and Historical Society, Columbus, O.

"Ichthyological Explorations in Colombia," C. H. Eigenmann, Carnegie Museum, Pittsburgh, Pa.

"Why this Association should Promote Museum Extension Work," W. B. Ashley.

"The Museums and the Boy Scouts," Charles Louis Pollard, Staten Island Association of Arts and Sciences, New Brighton, N. Y.

"Museum Work for the Boy Scouts," William L. Fisher, The Philadelphia Museums, Philadelphia.

"Insurance, Retiring Allowances and Pensions for Museum Men," M. J. Greenman, Wistar Institute of Anatomy, Philadelphia.

"Needless Regulations in Museums," A. R. Crook, Illinois State Museum, Springfield, Ill.

"The Functions of Museums and the Question of Special Exhibitions," Frederic A. Lucas, American Museum of Natural History, New York.

"The Museum Point of View in Botany," Edward L. Morris, Museum of the Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y.

"The Molding and Casting of Mushrooms and other Plants," Antonio Miranda, Museum of the Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y.

"A Celestial Sphere—An Apparatus Installed to Promote Interest in Astronomy," W. W. Atwood, Chicago Academy of Sciences, Chicago.

"The Deutsches Museum at Munich," Charles R. Toothaker, The Philadelphia Museums, Philadelphia.

"Legislation in the Interest of the Ohio State Museum," William C. Mills, Ohio State Archeological and Historical Society, Columbus, O.

The following officers were elected for the ensuing year:

President—Benjamin Ives Gilman, secretary of the Museum of Fine Arts, Boston.

First Vice-president—Oliver C. Farrington, curator of geology, Field Museum of Natural History, Chicago.

Second Vice-president—Arthur Hollick, curator of fossil botany, New York Botanical Garden, New York.

Secretary—Paul M. Rea, director, The Charleston Museum, Charleston, S. C.

Treasurer—W. P. Wilson, director, The Philadelphia Museums, Philadelphia.

Councilors (1913–16)—Henry L. Ward, director, Public Museum of the City of Milwaukee, Milwaukee; Edward K. Putnam, director, Davenport Academy of Sciences, Davenport, Iowa.

The association selected Milwaukee as the meeting place for 1914.

Paul M. Rea,
Secretary